

U.S. Patent Application No. 10/786,621
Amendment dated April 16, 2008
Reply to Office Action of October 16, 2007

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

1. (Currently amended) A valve metal suboxide powder comprising a primary suboxide phase purity of at least from 75% to 99.95% by weight and a valve metal phase, said valve metal suboxide powder having a BET surface area of from 0.5 to 10 m²/g, wherein said valve metal phase is present in an amount of from about 0.01% to about 25% by weight of said valve metal suboxide powder, and wherein said powder is an agglomerate or aggregate, and wherein said primary suboxide phase and said valve metal phase exist in said agglomerate or aggregate.

2. (Currently amended) The valve metal suboxide powder of claim 1, wherein said primary suboxide phase purity is at least 80% to 99.9% by weight.

3. (Currently amended) The valve metal suboxide powder of claim 1, wherein said primary suboxide phase purity is at least 85% to 99.9% by weight.

4. (Currently amended) The valve metal suboxide powder of claim 1, wherein said primary suboxide phase purity is at least 90% to 99.9% by weight.

5. (Currently amended) The valve metal suboxide powder of claim 1, wherein said primary suboxide phase purity is at least 95% to 99.9% by weight.

6. (Currently amended) The valve metal suboxide powder of claim 1, wherein said primary suboxide phase purity is at least 98% to 99.9% by weight.

7-11. (Canceled)

12. (Original) The valve metal suboxide powder of claim 1, further comprising a secondary suboxide phase.

13. (Canceled)

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14. (Currently amended) The valve metal suboxide powder of claim ~~4~~ 12, further comprising at least one tertiary suboxide phase.

15. (Canceled)

16. (Currently amended) The valve metal suboxide powder of claim ~~4~~ 1, wherein said valve metal phase is present in an amount of from about 0.01% to about 10% by weight of said valve metal suboxide.

17. (Currently amended) The valve metal suboxide powder of claim ~~4~~ 1, wherein said valve metal phase is present in an amount of from about 0.01% to about 5% by weight of said valve metal suboxide.

18. (Currently amended) The valve metal suboxide powder of claim ~~4~~ 1, wherein said valve metal phase is present in an amount of from about 0.01% to about 1% by weight.

19. (Original) The valve metal suboxide powder of claim 12, wherein said secondary suboxide phase is present in an amount of 0.01 to about 25% by weight.

20. (Original) The valve metal suboxide powder of claim 12, wherein said secondary suboxide phase is present in an amount of 0.01 to about 10% by weight.

21. (Original) The valve metal suboxide powder of claim 12, wherein said secondary suboxide phase is present in an amount of 0.01 to about 5% by weight of said valve metal suboxide.

22. (Canceled)

23. (Withdrawn) method to at least partially reduce a valve metal oxide comprising heat treating the valve metal oxide in the presence of a getter material and in an atmosphere which permits the transfer of oxygen atoms from the niobium oxide to the getter material, for a sufficient time and temperature to form an oxygen reduced valve metal oxide, and, wherein said method further comprises granulating a) said starting valve metal oxide, b) said getter material, c) both a)

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and b) separately or as a mixture, or d) granulating said oxygen reduced valve metal oxide after formation.

24. (Withdrawn) The method of claim 23, wherein said starting valve metal oxide and said getter material are mixed together and then granulated as a mixture.

25. (Withdrawn) The method of claim 23, wherein said getter material is a valve metal or a hydrided valve metal or both.

26. (Withdrawn) The method of claim 23, wherein said starting valve metal oxide comprises niobium pentoxide and said getter material comprises niobium metal or hydrided niobium.

27. (Withdrawn) The method of claim 23, wherein said granulating comprises wet screening.

28. (Withdrawn) The method of claim 23, wherein said granulating comprises wet granulating.

29. (Withdrawn) The method of claim 23, wherein said granulating comprises dry granulating.

30. (Withdrawn) The method of claim 23, wherein said granulating forms agglomerates having a size of -40 mesh.

31. (Withdrawn) The method of claim 23, wherein said mixture is formed by milling.

32. (Withdrawn) The method of claim 31, wherein said milling is ball milling.

33. (Withdrawn) The method of claim 23, wherein said granulating comprises tumbling the materials in a wet state.

34. (Withdrawn) The method of claim 23, wherein said granulating forms granules of a size of from 5 microns to about 1,000 microns.

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35. (Withdrawn) The method of claim 23, wherein said atmosphere is a hydrogen atmosphere or an inert atmosphere.

36. (Withdrawn) The method of claim 35, wherein said hydrogen atmosphere is present at a pressure of from about 10 Torr to about 2,000 Torr.

37. (Withdrawn) The method of claim 35, wherein said hydrogen atmosphere is present at a pressure of about 100 Torr to about 1,000 Torr.

38. (Withdrawn) The method of claim 23, further comprising at least one post-heat treatment under vacuum or in an inert gas.

39. (Withdrawn) The method of claim 38, wherein said post-heat treatment is at a temperature of from about 600°C to about 1400°C.

40. (Currently amended) A valve metal oxide having an atomic ratio of valve metal to oxygen of 1: less than 2.5, wherein said valve metal oxide comprises granules having a size of from about 5 microns to about 1,000 microns, wherein said valve metal oxide has a flow of from about 100 to about 1,000 mg/s as measured by ASTM B 213.

41. (Canceled)

42. (Currently amended) The valve metal oxide of claim 41 40, wherein said flow is from about 300 to about 700 mg/s.

43. (Original) The valve metal oxide of claim 40, wherein said granule size from about 30 to about 300 microns.

44. (Original) The valve metal oxide of claim 40, wherein said valve metal oxide is niobium oxide having an atomic ratio of niobium to oxygen of 1: less than 2.5.

45. (Original) The valve metal oxide of claim 40, wherein said valve metal is niobium having an atomic ratio of niobium to oxygen of 1: less than 1.5.

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46. (Original) The valve metal oxide of claim 40, wherein said atomic ratio is 1:1.1.
47. (Original) The valve metal oxide of claim 40, wherein the atomic ratio is 1:0.7.
48. (Original) The valve metal oxide of claim 40, wherein said atomic ratio is 1:0.5.
49. (Original) The valve metal oxide of claim 40, wherein said valve metal has a specific surface area of from about 0.5 to about 10.0 m²/g.
50. (Original) The valve metal oxide of claim 44, wherein said niobium oxide comprises NbO.
51. (Original) The valve metal oxide of claim 44, wherein said niobium oxide comprises NbO_{0.7}, NbO_{1.1}, or combinations thereof.
52. (Original) The valve metal oxide of claim 40, further comprising nitrogen.
53. (Original) The valve metal oxide of claim 40, wherein said valve metal oxide has the shape that is nodular, flaked, angular, or combinations thereof.
54. (Original) The valve metal oxide of claim 1, wherein said primary suboxide phase is NbO.
55. (Original) A capacitor comprising the valve metal suboxide of claim 1.
56. (Original) A capacitor anode comprising the valve metal suboxide of claim 1.
57. (Original) A capacitor comprising the valve metal suboxide of claim 40.
58. (Original) A capacitor anode comprising the valve metal suboxide of claim 40.
59. (Original) The valve metal oxide of claim 40, wherein said valve metal oxide comprises a primary suboxide phase purity of at least 75% by weight.
60. (Original) The valve metal oxide of claim 40, wherein said valve metal oxide comprises a primary suboxide phase purity is at least 90% by weight.
61. (Original) The valve metal oxide of claim 40, wherein said valve metal oxide comprises

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a primary suboxide phase purity is at least 99.95% by weight.

62. (Original) The valve metal oxide of claim 40, wherein said valve metal oxide comprises a valve metal phase.

63. (Original) The valve metal oxide of claim 40, wherein said valve metal oxide comprises a secondary suboxide phase.